

## THE LIGHT BROWN APPLE MOTH IN NEW ZEALAND: FACT vs. FICTION

March 20, 2008

*Dr. Daniel Harder and Jeff Rosendale, authors of “Integrated Pest Management Practices for the Light Brown Apple Moth in New Zealand: Implications for California,” respond to comments on their report by California Department of Food and Agriculture (CDFA) Primary Entomologist Kevin Hoffman and Max Suckling of New Zealand HortResearch.<sup>1</sup>*

The intent of the Harder-Rosendale New Zealand report (March 2008) was to make information publicly available on integrated pest management (IPM) practices in New Zealand that will likely be effective to control the Light Brown Apple Moth (LBAM) in California agriculture. The New Zealand report was based on surveys of practices in New Zealand and interviews with LBAM experts in the New Zealand government agricultural and horticultural research agency HortResearch.

CDFA’s comments on the New Zealand report do not alter the report’s solid scientific findings that LBAM is largely controlled by natural predators in New Zealand and is not a biological or environmental threat there.

### General comments

**FICTION:** Dr. Hoffman begins his analysis of the New Zealand report by stating that there are “financial and environmental costs” associated with integrated pest management (IPM) practices and then focuses on only one IPM strategy, introduction of non-native predators, a strategy that the New Zealand report does not recommend.

**FACT:** Dr. Hoffman overlooks the basic tenets of IPM: to first determine whether an identified pest poses a problem that requires intervention and, if a problem is identified, to find a means to address it that is least toxic and least disruptive to the natural ecosystem. To imply that there are financial and environmental costs to the New Zealand paper’s recommendation that CDFA determine to what extent LBAM is being kept under control by natural predators already present in California diverts attention from **the real costs at issue in CDFA’s current LBAM strategy: the costs to human health and the environment of a multi-year or indefinite campaign of regular aerial spraying of populated areas.**

**FICTION:** Dr. Hoffman claims the authors of the New Zealand report received suggested changes to their paper from New Zealand HortResearch staff and did not incorporate these changes.

**FACT: This is simply not true.** The authors solicited review comments and corrections from HortResearch and other LBAM experts mentioned in the report. To date, the authors have received only a single, one-word change from their New Zealand sources; this change was incorporated in the final draft of the report. No other changes were suggested, and the authors have received no other comments from peer reviewers aside from praise for the report. The report’s conclusions accurately reflect the information provided by the HortResearch staff and website.

**FICTION:** Dr. Hoffman believes the report overstates when it asserts that LBAM is largely kept under control by IPM practices and natural enemies.

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<sup>1</sup> Some comments from Mr. Hoffman were editorial in nature and/or address production corrections. These are not addressed as they do not detract from the report’s solid findings.

**FACT:** HortResearch personnel stated that LBAM is 80 – 90% controlled by natural enemies in New Zealand. Some of these enemies were introduced to New Zealand from Australia and elsewhere. Rare LBAM outbreaks are effectively controlled by the use of insect growth regulators (IGRs) in agricultural systems. Worthy of note is that LBAM was a greater problem in New Zealand when broad-spectrum, organophosphate pesticide use had killed off the natural predators of LBAM. Once organophosphate use stopped in New Zealand, the populations of LBAM's natural enemies rebounded and these enemies are now the major control for LBAM.

**FICTION:** Dr. Hoffman states that “The introduction of non-native natural enemies has its pitfalls,” implying that the report advocates introduction of non-native LBAM enemies to LBAM.

**FACT:** The report does not advocate introducing non-native LBAM enemies. A wide variety of potential enemies for control of LBAM are already present in California, including insectivorous birds, small mammals, earwigs, ants, native *Trichogramma* wasps, ichneumon wasps, tachinid flies, spiders, beetles, lacewings, and others. A full listing of the enemies to LBAM in New Zealand is available at: <http://www.hortnet.co.nz/key/stone/info/enemies/lba-enem.htm>. The authors strongly support immediate initiation as of a major study, supported by CDFA, of LBAM enemies in California.

**FICTION:** Dr. Hoffman states that the New Zealand report “focuses on applying the New Zealand model to the currently infested area of California and ignores what might happen should the moth become established in different environments where the required IPM practices might be less effective.”

**FACT:** Venette et al. (2003), a report that Dr. Hoffman quotes, makes clear that **LBAM prefers the mild climate of New Zealand and Coastal California; it does not reproduce well below 7.1 degrees C (45 degrees F) and or above 30.7 degrees C (87 degrees F)**; thus, LBAM is unlikely to establish in other types of environments. In addition, Dr. Hoffman underestimates the flexibility of IPM, which, by definition, works with the local ecosystem to find the least environmentally disruptive solution to a pest problem should such a problem arise. It is notable that LBAM is established in Europe and is not a quarantine pest there.

**FICTION:** Dr. Hoffman questions the citing of expert sources in New Zealand as the basis for information in the report.

**FACT:** Observation of conditions and interviewing of expert sources in another country that has comparable conditions to California's and where LBAM is also an introduced exotic are basic background-gathering practices in scientific research. **CDFA should have undertaken a study of this type prior to launching a radical and risky eradication program involving chemicals of questionable safety and effectiveness to achieve a goal that may not even be necessary.**

### **Specific comments**

**FICTION:** Dr. Hoffman says, “the report significantly understates the moth's fecundity.”

**FACT:** CDFA's claims about LBAM's fecundity ignore the high (80-90%) rate of parasitism and predation of the moth's eggs in New Zealand that is likely also occurring in California.

**FICTION:** Dr. Hoffman takes issue with the use of the term “colony” for describing how LBAM establishes itself in an agricultural field, noting that the term “colony” is not associated with Lepidopteran insects.

**FACT:** The word “colony” was consciously chosen as a concept familiar to the public. “Colony” as an entomological term refers to a closely related community of social insects such as honeybees. The authors used the term to explain that LBAM does not build up to significant numbers in a central location but instead continues to disperse to other plants.

**FICTION:** Dr. Hoffman suggests that LBAM's capacity to feed on different plants is a negative feature, "Polyphagy helps overcome host availability as a limiting factor, and therefore helps populations grow."

**FACT:** This statement oversimplifies insect biology, ignoring the fact that organisms adapted to a wide range of food sources are highly unlikely to decimate a single food supply. Dr. Hoffman's statement also ignores the impact of predators.

**FICTION:** Dr. Hoffman suggests that the photo of LBAM leaf damage in the New Zealand report was staged.

**FACT:** The photo was not staged and shows feeding damage on the edge of the leaf consistent with damage from LBAM larvae. The authors cannot verify with absolute certainty that the larva pictured is LBAM as this requires DNA testing that was not available on site in New Zealand.

**FICTION:** Dr. Hoffman comments, "Neither of the authors are entomologists, so their assertion that they had great difficulty finding LBAM could just as easily be from their lack of expertise... as from the assumed lack of LBAM."

**FACT:** The authors have decades of experience working with plants and identifying insects and are very skilled in finding LBAM.

**FICTION:** Dr. Hoffman criticizes the Tortricid moth larva parasitization study at UC Santa Cruz arboretum.

**FACT:** Dr. Hoffman's criticism diverts attention from the real question: **why isn't CDFA investigating the extent to which LBAM larvae are being naturally parasitized?** A basic tenet of IPM is to determine the extent to which natural controls are working successfully in an ecosystem before considering an intervention, especially a highly intrusive intervention such as aerial spraying. The point of the small survey initiated at the UCSC Arboretum was to begin to enumerate the number of natural enemies and the level of parasitism of Tortricid larvae. Understanding the level of predation by these natural enemies to LBAM is critical to understanding what if any measures are needed to respond to the moth's presence in the state. This important research work has not been part CDFA's effort to eradicate this pest.

**FICTION:** Dr. Hoffman states that pheromone "trap shutdown is an indirect indication that the pheromone disruption treatment is working."

**FACT:** When pheromone is dispersed into an environment, traps using the same pheromone to attract male moths are considered "blinded" as the pheromone in the air negates the pheromone being emitted from the traps. The males simply cannot find the traps so the number of males captured decreases. Correspondence from New Zealand LBAM researcher John Clearwater (who has more than 25 years of working with LBAM) indicates that CDFA is correct in stating that the traps are blinded but the CDFA is **wrong** that a lower trap count following treatment indicates that mating disruption is occurring and successful. A considerable amount of work has been done on LBAM mating disruption in New Zealand. Mating disruption pheromones are not in widespread use by apple or grape growers in New Zealand as use of pheromones in the environment masks the ability to effectively monitor the populations of the moth so important to IPM control of the pest.

**FICTION:** Dr. Hoffman states that "USDA uses aerial application of gypsy moth pheromone to eradicate populations along the 1,200 mile leading edge of the infested area in the Eastern U.S. as part of their Slow the Spread campaign." He cites this information as evidence that pheromones have been used for eradication of a pest.

**FACT:** Dr. Hoffman appears to not understand the meaning of the word “eradication,” which means 100% elimination of a population, as he uses the term here to describe an ongoing cycle of chemical control. Activities to "slow the spread" of a pest are not eradication. This use of "eradication" is not only misleading but in direct contradiction to sound IPM, which strives to reduce or eliminate use of chemical controls and only uses a chemical control in the context of a specific plan for avoiding continuing or repeated chemical use in the future. Applying chemicals repeatedly to control the same pest unnecessarily subjects human populations and ecosystems to toxic, disruptive exposures and is not a sustainable approach. The LBAM “eradication” is planned to be a three- to five-year or longer program of annual chemical use; CDFA's history of repeated annual "eradication" programs for the same pests is a clear precedent.

**FICTION:** Dr. Hoffman states that “the authors seem to be advocating the areawide (i.e., aerial) use of IGRs for LBAM eradication.”

**FACT:** The authors **do not** advocate the areawide (**certainly not** aerial) use of IGRs for the control of LBAM in **any instance** outside of agriculture. The New Zealand report presents the most effective tools to control LBAM available anywhere. The exceptional research effort by expert HortResearch personnel in developing an effective management and control tool for LBAM should be adopted where needed in agricultural and horticultural production systems. The techniques of close monitoring and judicious use of IGRs based on the results of monitoring have been shown to result in no evidence of LBAM on crops. These techniques can be used to insure that crops from LBAM areas are free of the insect, allowing the export of these products to countries with LBAM quarantine restrictions. The authors do not advocate the aerial application of any substance over urban populations. These effective tools for control need to remain within agriculture.

**FICTION:** Dr. Hoffman states that other Tortricid moth species in California “have insecticides as one of the recommended treatments.”

**FACT:** None of these species is the subject of an eradication program.

**FICTION:** Dr. Hoffman defends the use of chlorpyrifos in nurseries to treat for LBAM.

**FACT:** Dr. Hoffman ignores the fact that organophosphate insecticides like chlorpyrifos destroy the beneficial insects that prey on LBAM and other pests.

In conclusion, the authors stand by the factual findings presented in the New Zealand report. The factual information and recommendations of the report remain intact. As yet, the State has not seriously pursued any of the recommendations, which offer sound alternatives to the current eradication program.